

IN THE CLAIMS:

Claims 1-24 (Cancelled)

25. (New) A method for finish machining of tooth surfaces of a gear to be machined, said method comprising:

meshing at least one counter gear with the gear to be machined;

oxidizing the tooth surfaces by supplying, without abrasive grain, water or an aqueous solution onto meshing tooth surfaces of the gears; and

rotating the gears to bring tooth surfaces of the counter gear sequentially into sliding or rolling contact with each of the tooth surfaces of the gear to be machined, said contact removing oxide to impart surface roughness to the tooth surfaces of the gear to be machined and repeating said contact as the gears are rotated.

26. (New) A method for finish machining of tooth surfaces according to claim 25, further comprising installing the counter gear or a gear having a profile the same as that of the counter gear, in combination with the machined gear, in a transmission.

27. (New) A method for a finish machining of tooth surfaces according to claim 25, wherein the counter gear is less readily oxidized than the gear to be machined.

28. (New) A method for finish machining of tooth surfaces according to claim 25, wherein the gear to be machined and the counter gear are rotated while applying a pressure of at least 5 MPa between tooth surfaces in meshing contact with each other.

29. (New) A method for finish machining of tooth surfaces according to claim 25, wherein tooth surfaces of the counter gear have a surface roughness R_z in a range of from 0.5 to 10 microns.

30. (New) A method for finish machining of tooth surfaces according to claim 25 utilizing aqueous solution containing at least one of a fluorine-containing acid, nitric acid, oxalic acid, hydrogen peroxide, sulfuric acid, hydrochloric acid and sodium chloride.

31. (New) A method for finish machining of tooth surfaces according to claim 25, wherein the gear to be machined and the counter gear are meshed with each other with axes of the gears arranged in parallel and further comprising moving the gears relative to each other with axial reciprocating movement while rotating the gears.

32. (New) A method for finish machining of tooth surfaces according to claim 25, wherein the gear to be machined and the counter gear are meshed with each other with axes of the gears arranged in parallel and further comprising repeatedly increasing and decreasing a distance between the axes of the gears while rotating the gears.

33. (New) A method for finish machining of tooth surfaces according to claim 25, wherein the gear to be machined and the counter gear are mounted on respective shafts and further comprising reciprocally tilting at least one shaft from a parallel state to a given angle, with respect to the other shaft, while rotating the gears.

34. (New) A method for finish machining of tooth surfaces according to claim 25, wherein the gear to be machined and the counter gear are rotated with axes of the gears intersecting each other at an approximately right angle.

35. (New) A method for finish machining of tooth surfaces according to claim 25, wherein the gear to be machined and the counter gear are rotated while relatively moving the position of the contact while the gears are meshed.

36. (New) A method for finish machining of tooth surfaces according to claim 25, wherein the gear to be machined and the counter gear are rotated while in meshing engagement until the vibration and noise derived from meshing reaches a desired magnitude.

37. (New) A method for finish machining of tooth surfaces according to claim 25, wherein the gear to be machined and the counter gear are rotated while in meshing engagement until the surface roughness of the tooth surfaces of the gear to be machined reaches a desired magnitude.

38. (New) A method for finish machining of tooth surfaces according to claim 25, wherein tooth surfaces of the gear to be machined are brought into meshing contact with the counter gear 10,000 to 20,000 times.

39. (New) A method for finish machining of tooth surfaces according to claim 25, further comprising measuring the vibration or noise derived from the meshing and stopping the rotation based on a measured value of the vibration or noise.

40. (New) A method for finish machining of tooth surfaces according to claim 39, wherein the measurement of vibration or noise is performed at fixed or unfixed intervals and the rotation is stopped at a point in time when the measured value becomes smaller than a given value.

41. (New) A method for finish machining of tooth surfaces according to claim 39, wherein the measurement of vibration or noise is performed at fixed or unfixed intervals and the rotation is stopped at a point in time when the measured value has increased threefold or more.

42. (New) A method for finish machining of tooth surfaces according to claim 40, wherein the measurement of vibration or noise is performed at fixed or unfixed intervals and the rotation is stopped at a point in time when a gradient of change in the measured value with respect to time turns from negative to positive.

43. (New) A gear having tooth surfaces finish machined produced by the method of claim 25.

44. (New) A method for finish machining of tooth surfaces of at least first and second gears to be machined, said method comprising:

meshing at least the second gear to be machined with the first gear to be machined;

oxidizing the tooth surfaces by supplying, without abrasive grain, water or an aqueous solution onto meshing tooth surfaces of the gears; and

rotating the gears to bring tooth surfaces of the first and second gears to be machined, sequentially into sliding or rolling contact, said contact removing oxide to impart surface roughness to the tooth surfaces of the gears to be machined and repeating said contact as the gears are rotated.

45. (New) A device for finish machining of tooth surfaces of a gear to be machined, said device comprising:

a first rotary shaft which rotatably supports said gear to be machined thereon,

a second rotary shaft which rotatably supports thereon a counter gear for meshing with the gear to be machined;

water supply means for supplying, without abrasive grains, water or an aqueous solution to meshing portions of the tooth surfaces of the gear to be machined and the counter gear; and

means for rotating the gear to be machined and the counter gear while supplying the water or aqueous solution to the meshing portions.

46. (New) A device for finish machining of tooth surfaces according to claim 45, further comprising:

a liquid reservoir for receiving the water or aqueous solution from the meshing portions, said liquid reservoir being disposed below said gear to be machined and said counter gear; and

liquid circulation means for filtering water or aqueous solution and returning the water or aqueous solution from the liquid reservoir to the meshing portions.

47. (New) A device for finish machining of tooth surfaces according to claim 45, further comprising:

torque adjustment means for applying a given pressure to the meshing portions of the contacting tooth surfaces.

48. (New) A device for finish machining of tooth surfaces according to claim 45, further comprising:

rotary shaft moving means for moving said first rotary shaft relative to said second rotary shaft in such a way so as to change a position of contact of the meshing portions.

49. (New) A method for finish machining of tooth surfaces according to claim 25 wherein said sliding or rolling contact produces a mechano-chemical action without grinding.

50. (New) A method for finish machining of tooth surfaces according to claim 44 wherein said sliding or rolling contact produces a mechano-chemical action without grinding.